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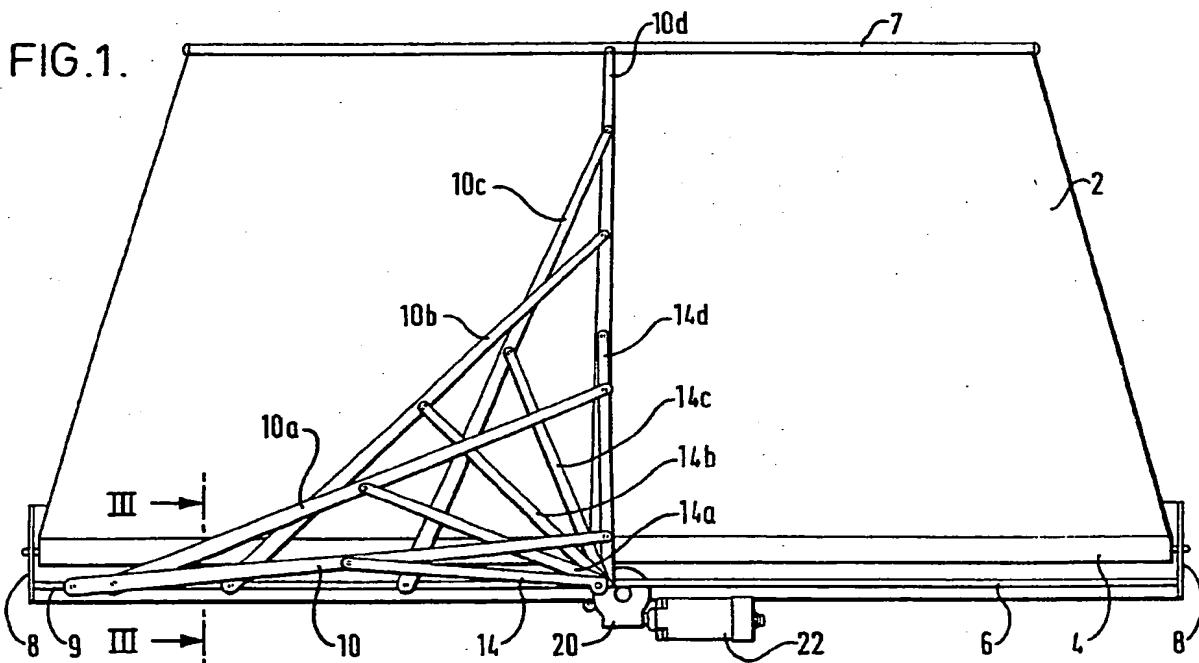
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GB 0580217 A US 4068921 A

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(54) Retractable screens

(57) A retractable roller blind (2) for use inside the rear windscreen of a motor vehicle has a blind extending arm (10). The roller of the blind is mounted in a housing (6) and the housing provides a guide track (9) in which one end of the arm (10) is located for both sliding and pivoting movement. The other end of the arm (10) is pivotally mounted to the central region of a bar (7) on the free end of the blind (2). A support strut (14) connects the centre of the arm (10) to the housing (6) to stabilise the arm (10). In use, the blind is extended out from its retracted position by drawing the arm (10) along the guide track (9) from a horizontal position until it reaches a position transverse (10d) to the guide track. The extending arm arrangement has the advantage of being made of a small number of simple parts and is unobtrusive when the blind is fully extended.

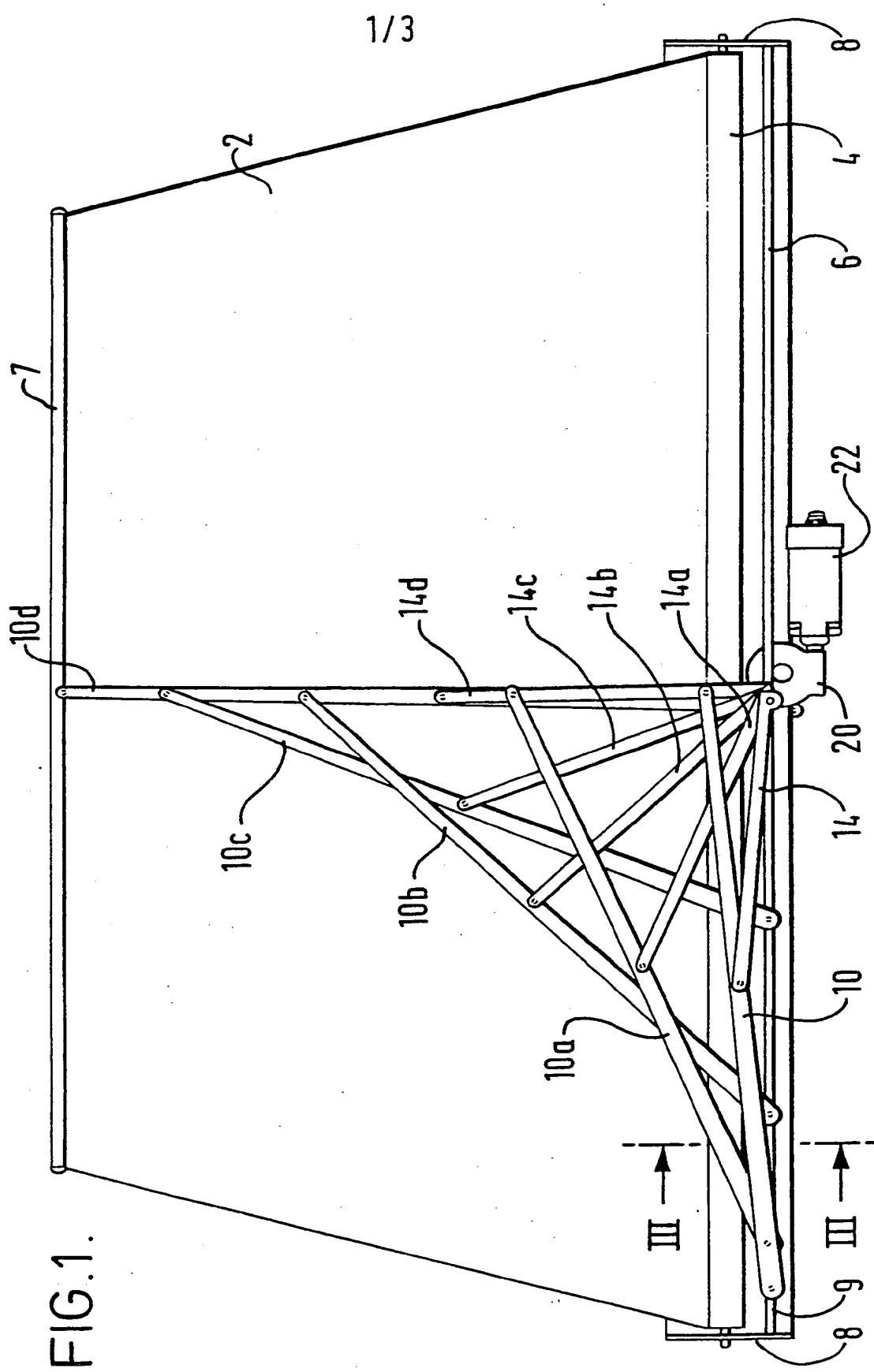


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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FIG. 1.



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FIG.2.

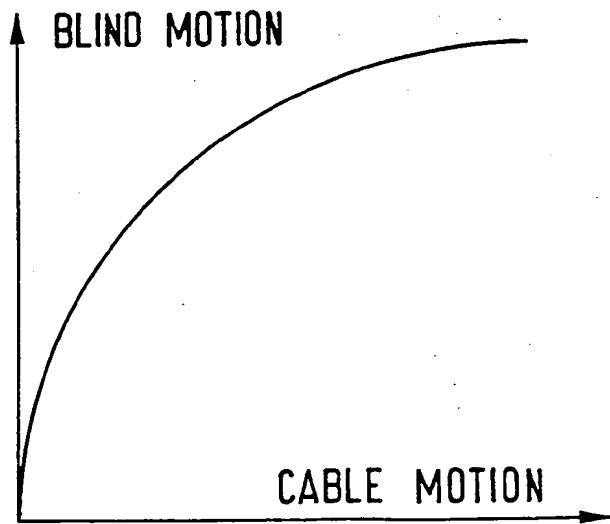
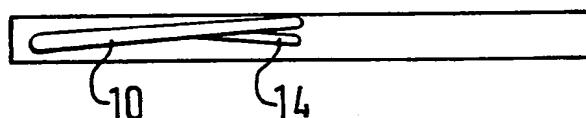
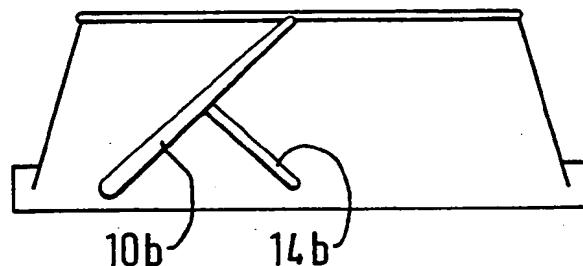
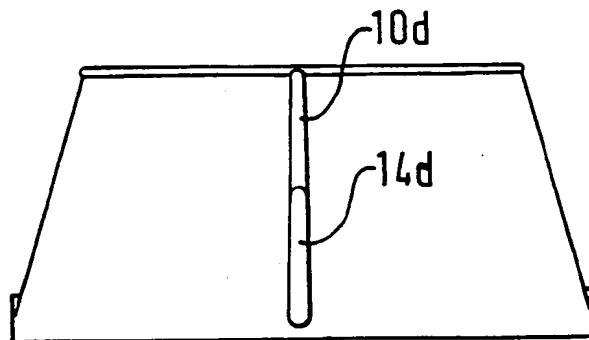


FIG.4.

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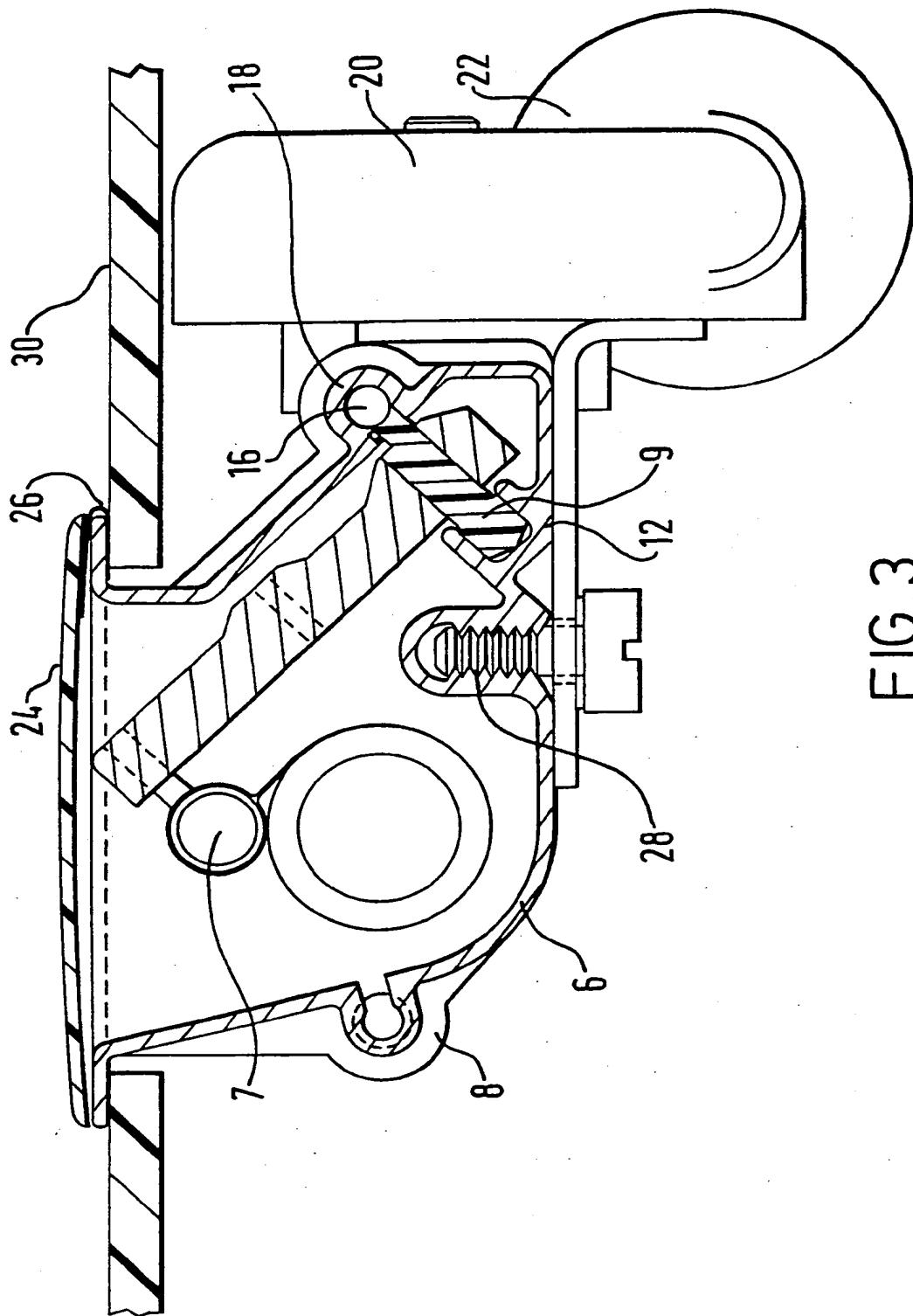


FIG. 3.

RETRACTABLE SCREENS

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The present invention relates to retractable screening devices placed near windows in order to act as sun blinds or to provide a means of obtaining privacy. The invention also relates to extendible roller blinds used in motor vehicles to screen the windows of the motor vehicle.

10 Roller blinds for use in front of windows are well known and comprise a sheet of screening material wound onto a roller. The roller is usually mounted to a housing and has spring means between the roller and the housing to cause the roller to rewind after blind material has been pulled off the roller. The free end portion of the blind material is pulled out from the roller to form the screen. The length of blind material pulled out can be prevented from rolling back onto the roller either by securing the free end portion to a fixing point or by a locking device in the roller mechanism which prevents the spring rewind mechanism from acting unless a further unwinding force is applied and the free end portion let loose. Usually a centrifugally disengageable latching mechanism is employed.

15 Sun blinds can be provided inside motor vehicles immediately adjacent to one or more of the windows, usually the rear window. A disadvantage of the manually operated blinds is that the driver of the vehicle, in order to operate blinds by the rear window, has to stop the vehicle and then enter the rear passenger space in order to draw the blinds in front of the window. A solution to this problem is to provide blinds which have an extension and retraction mechanism which can operate automatically and by remote control

DE-A-3735622 (Baumeister & Ostler) concerns an extendible roller blind for motor vehicles which has mechanical extending means. The roller blind in question 5 has a housing which the roller is mounted to. The housing is mounted inside the rear window on the parcel shelf of the vehicle. The blind has a free end portion attached to a support bar which can be pulled upwards and outwardly from the housing in order to extend the blind. The 10 extending means comprises a pair of arms pivotally connected to respective ends of the housing. The other ends of the arms are connected to the support bar. The support bar has a channel member extending along the length thereof. The ends of the arms are located in this channel 15 and are capable of both sliding and pivoting movements in relation to the channel. In a blind retracted position the ends of the arms lie at respective ends of the support bar. Driving means in the form of an electric motor is connected via drive rods to the shoulders of the arms which extend 20 below the pivots mounting the arms to the housing. In a blind retracted position, the arms assume positions which are generally parallel to one another and with the housing and support bar. In order to extend the blind, the arms are pivoted into a position in which they form an angle 25 with the housing of about 45°. During this pivoting movement, the ends of the arms located in the channel of the support bar slide outwardly away from one another.

DE-A-3612165 (Baumeister & Ostler) concerns roller 30 blind extending mechanisms which are similar in principle to that of DE-A-3735622 except that instead of the arms being pivotally connected to respective ends of the housing, they are pivotally connected in the central region of the housing and are arranged to cross over one another 35 whether the blind is in a retracted or an extended position. One arm has a slot for the other arm to pass

through. In moving the blind from a retracted position to an extended position, the cross over between the two arms moves away from the housing.

5 A further variation shown in DE-A-3612165 is that of a pair of arms pivotally connected next to one another at the centre of the housing. The ends of the arms connected to the housing have interengaging gear teeth so that a driving force applied to one arm will also pivot the other arm. In
10 a blind retracted position, the arms lie generally parallel to the housing and the support bar. In order to extend the blind, the arms are swung upwards towards one another.

15 The retractable screens described above are costly to manufacture and assemble. Also they are prone to seizure especially when the components are old and worn. The opening and retracting mechanisms are not suited to cope with curved screens.

20 EP-0394124B1 (Farnier et Penin) teaches a retractable roller blind which has an elongate housing which holds the blind roller. The blind extending mechanism comprises a pair of struts. The struts are pivotally connected to respective ends of a support bar connected to the free end portion of the blind material. The other end of each strut is pivotally connected to the end of a respective rack. The racks are slidable longitudinally within the housing. In the blind retracted position, the struts will lie generally parallel to one another, the housing and the support bar.
25 In order to extend the blind, the racks are moved along the housing causing the struts to move into positions transverse to the housing and the support bar. This blind opening mechanism has a large number of component parts such as the rack sliders which are expensive to
30 manufacture. The screens are also costly to assemble.
35 Whilst a curved screen is illustrated the mechanism is not

really adapted to cope with curved screens because of the rack sliders which appear to require straight guide tracks to run in. The potential curvature of a screen would seem to be restricted by this.

5

The present invention seeks to solve the disadvantages inherent in the aforementioned retractable screens.

Accordingly, the present invention provides a screen
10 comprising a retractable screen member having a free end by
which the screen can be pulled out to extend it, there
being guide means extending generally transverse to the
direction of movement of the said screen free end, at least
one arm member for extending the screen, one end of the arm
15 member being slidably and pivotally connected to the guide
means and the other end of the arm member being pivotally
connected to the central region of the extendible free end
of the screen and support means to counter lateral movement
of the screen during extension or retraction, wherein the
20 end of the arm which is slidably and pivotally connected to
the guide means can slide along the guide means so that in
response to a driving force the arm is moveable between a
first position in which the arm lies generally parallel to
the guide means and the screen is in the retracted position
25 and a second position in which the arm is generally
transverse to the guide means and the screen is in the
extended out position.

The ends of the arm are preferably restricted to
30 perform movements which are transverse to one another.
Accordingly a substantially horizontal movement of the end
of the arm located with the guide means is translated as a
substantially vertical movement of the end of the arm
connected to the centre of the free end portion of the
35 screen. By virtue of the preferred geometry of movement of
the arm, the centre of the arm exhibits an arcuate

movement. In moving from a screen closed position to a screen fully extended position the arm preferably translates through about 90°.

5 The support means to counter lateral movement of the screen during extension or retraction may be provided by the screen material itself. Side portions of the screen may be specially reinforced to perform this function.

10 The screen is preferably a sheet of flexible material which can be rolled, folded or compressed when in the closed position. Alternatively, the screen may be made up of a series of interconnected flexible or rigid strips e.g. a venetian blind.

15 Preferably there is just one arm member pivotally connected to the central region of the free end portion of the screen member.

20 The guide means is preferably a guide track.

Preferably the screen is retained by a housing. In the case of a roller blind the roller is preferably mounted for rotation to the housing.

25 Where a housing is provided the guide means is preferably integral with the housing.

30 The support means is preferably a support strut associated with at least one arm. One end of the support strut is preferably pivotally connected to said at least one arm. The other end is preferably pivotally connected to a fixed location. When two arms are provided, one or both may have a respective support strut.

Where a housing is provided the fixed location is preferably at a point on the housing. Alternatively, the fixed location may be part of a motor vehicle.

5

Preferably, the length of the arm member is generally equivalent to the extended length of the screen when it is in a fully extended out position.

10

With the screen in the retracted position, the arm and guide means preferably make an acute angle no greater than 10°.

15

With the screen in the retracted position, the arm and the support strut preferably make an obtuse angle less than 180°.

Preferably the free end portion of the screen member is a support bar.

20

The screen preferably further comprises driving means coupled to the end of the arm slidably and pivotally connected with the guide means.

25

The end of the arm slidably and pivotally connected with the guide means preferably has a slide member which is slidably located with the guide means and pivotally connected to the arm. The length of the slide member is preferably less than half the length of the guide means.

30

The driving means is preferably a cable actuated by an electric motor. Preferably the cable moves in a cable guide channel which runs substantially parallel to the guide means. One end of the cable is preferably attached to the slide member. At least a portion of the other end of the cable is preferably notched to form a rack which

engages with a pinion. Rotation of the pinion causes the cable to move within the cable guide channel.

Alternatively, at least a portion of the cable may be
5 helical thereby forming the said rack for engagement with
the pinion.

An advantage of a drive is that it can deliver a
pushing or a pulling force. They are flexible and so they
10 can also operate when bent around corners.

The housing may have a hinged lid which closes the
housing when the screen is in a retracted position.

15 The invention also includes a kit of parts for the
assembly of a retractable screen as herein defined.

20 The invention also includes a conveyance or
construction fitted with a retractable screen as herein
defined. The said conveyance may be a motor vehicle and
the said construction may be a building, a portable
building, or trailer.

25 An embodiment of the invention will now be described
with reference to Figures 1 to 4 in which:-

Figure 1 is a front plan view of a roller blind in
accordance with the invention showing the
extending mechanism in various positions;

30 Figure 2 is schematic representations of the blind of
Figure 1 in the extended, partly extended, and
retracted positions;

Figure 3 is a section along the line III-III of Figure 1
when the roller blind is in a retracted position;

35 Figure 4 is a graph showing the relative velocities of the
blind and actuating cable movements.

Figure 1 shows an extended roller blind in accordance with the invention. The roller blind comprises a flexible sheet of material forming the screen 2 which is wound onto a roller 4. The roller 4 is mounted to a housing 6. The roller is spring-loaded so that when the bar 7 attached to the free end portion of the blind is pulled away from the housing 6, tension is wound into a spring (not shown) which urges the roller 6 to wind the screen 2 back onto the roller again. The housing 6 has end plates 8 which support the axle of the roller blind and which provide, at least on one side, reaction for the torsion spring which winds the screen onto the roller during retraction. The housing 6 has a longitudinally extending guide track 9.

15

An extension lever 10 is provided, one end of the lever 10 is pivotally connected to the centre of the bar 7 of the blind, and the other end is pivotally connected to a slide member 12 (Figure 3) which can slide along guide track 9. Also provided is a support strut 14, one end of which is pivotally connected to the midpoint of the extension lever 10, the other end of which is pivotally connected to the centre of the housing 6. The support strut 14 is half the length of the extension lever 10. The extension lever 10 and support strut 14 shown in Figure 1 are in a blind retracted position. Extension lever shown as 10d and support strut shown as 14d are in a blind fully extended position. Extension levers shown as 10a, 10b, 10c, and respective support struts shown as 14a, 14b, 14c, are in various blind partly extended positions. The extended, partly extended, and retracted positions of the extension lever 10 and the support strut 14 are shown schematically in Figure 2.

35

The roller blind and its extending mechanism are arranged so that the blind extends out at an angle of about

45° relative to the housing. This angle enables the blind to be extended out just inside the rear windscreen of a saloon car.

5 When the blind is in the retracted position, there is an obtuse angle between the support strut 14 and the extension lever 10. If the angle was 180° then the mechanism would simply lock and no extension of the blind would be possible. Therefore, an angle less than 180° is
10 required. In the present embodiment the angle is about 170°. In a partly extended position, the support strut 14 and the extension lever 10 are transverse to one another.

15 Referring to Figure 3, a drive cable 16 is provided which runs in cable channel 18 in the housing 6. The drive cable 16 is a helical cable of the type normally used in the actuating mechanisms of car sun roofs. One end of the cable is connected rigidly to the slide member 12 and the other end portion of the cable is in engagement with a
20 pinion (not shown) which in turn is driven by a slipping clutch, wheel reduction gear, and worm gear (not shown specifically, but indicated generally as drive gear 20). The worm gear is driven by electric motor 22.

25 The housing has a lid 24 which is connected to the housing by a hinge 26. When the blind is in a retracted position the lid simply falls down under the influence of gravity to cover the open portion of the housing. The housing has screw mounting points 28 to allow the housing
30 to be fitted below the rear parcel shelf 30 of a motor vehicle.

35 The electric motor is operated by way of a rocker switch which is conveniently located in the vicinity of the driver and/or the passengers of the vehicle. In the most basic arrangement, the end stops for the retracted and

extended positions of the blind are simply mechanical end stops. The switch therefore need only be a two-way rocker switch. Upon reaching either end stop, the clutch of the electric motor slips and therefore prevents the overloading
5 and possible damage to the motor or the mechanism.

By employing limit switches and a logic arrangement of relays, being mechanical or electronic relays, a single one-shot operation is possible. However, with this kind of
10 operation, it is not possible for the blind to be held in a partly extended position. The blinds with this kind of operating control can only be fully extended or fully retracted.

15 The blind material is a perforated plastics film. The housing 6 is of extruded aluminium. The extension lever 10 and support strut 14 are of a light metal such as aluminium alloy. The lid of the housing is of a plastics material. The hinge 26 linking the lid 24 to the housing 6 is a
20 flexible film of plastics material. The slide member 12 which runs in guide track 9 and which is connected to drive cable 16 is made of a plastics material.

25 The operation of the electrically operated roller blind from the retracted position is as follows.

On activating the motor the pinion rotates and because of its engagement with the helical surface of the cable, the cable 16 is drawn along the cable channel 18 in housing
30 6. The slide member 12 is caused to move along the guide track 9 in response to the pulling force of the cable 16. As the end of the extension lever 10 pivotally connected to the slide member 12 moves along the guide track 9, the other end of the extension lever 10 moves transversely away
35 from the guide track 9. These movements are continued until the extension lever 10 lies transversely to the guide track

9 and the screen is fully extended. When the blind is fully extended the support strut 14 lies unobtrusively in line with the extension lever 10. When the electric motor is operated and the blind first extended out from the housing, 5 the lid 24 is simply pushed open by the extension lever 10.

In order to retract the extended blind the extending movements are reversed. In reverse the cable 16 exerts a pushing force on the slider 12 and the spring loading of 10 the roller in the retracting direction assists the retracting movements.

Whilst the path of the slide member in the guide track is straight and the path of the end of the extension lever 15 10 at bar 8 of the blind is straight, the velocity of both points differ due to the geometry. The relative velocities of the movements of the cable end and blind end of the extension lever 10 are shown in Figure 4.

Whilst the invention has been described with reference 20 to the specific embodiment, many variations and modifications thereof are possible within the scope of the invention.

CLAIMS

1. A screen comprising a retractable screen member having
5 a free end by which the screen can be pulled out to extend
it, guide means extending generally transverse to the
direction of movement of the said screen free end, at least
one arm member for extending the screen, one end of the arm
member being slidably and pivotally connected to the guide
10 means and the other end of the arm member being pivotally
connected to the central region of the extendible free end
of the screen, and support means to counter lateral
movement of the screen during extension or retraction,
wherein the end of the arm which is slidably and pivotally
15 connected to the guide means can slide along the guide
means so that in response to a driving force the arm is
moveable between a first position in which the arm lies
generally parallel to the guide means and the screen is in
the retracted position and a second position in which the
20 arm is generally transverse to the guide means and the
screen is in the extended out position.

2. A screen as claimed in Claim 1 wherein in moving
between the said first and second positions the ends of the
25 arm member perform movements which are transverse to one
another and the centre of the arm exhibits an arcuate
movement.

3. A screen as claimed in Claim 2 wherein the support
30 means is a strut associated with at least one arm member,
one end of the strut being pivotally connected to said at
least one arm member, the other end of the strut being
pivotally connected to a fixed location.

- 35 4. A screen as claimed in Claim 3 wherein the arm and
guide means make an acute angle no greater than 10° when

the screen is in its retracted position and the arm and the support strut make an obtuse angle less than 180°.

5. A screen as claimed in any one of Claims 1 to 4 further comprising drive means coupled in a drive transmitting manner to the end of the arm slidably and pivotally connected with the guide means.

10. 6. A screen as claimed in any one of Claims 1 to 5 wherein the screen member is a sheet of flexible material which can be rolled, folded or compressed when in the retracted position.

15. 7. A screen as claimed in Claim 6 further comprising a housing and the screen member is retained by the housing when in the retracted position.

20. 8. A screen as claimed in Claim 7 wherein the screen member is a roller blind and the roller of the blind is mounted to the housing for rotation in relation thereto.

25. 9. A screen as claimed in any preceding claim wherein there is one arm member and this is pivotally connected to the central region of the free end portion of the screen member.

10. A retractable screen substantially as hereinbefore described and as shown in the accompanying drawings.

30. 11. A conveyance or construction fitted with a retractable screen as claimed in any one of Claims 1 to 10.

12. A kit of parts for the assembly of a retractable screen as claimed in any one of Claims 1 to 10.

Patents Act 1977
 Examiner's report to the Comptroller under Section 17
 (The Search report)

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Relevant Technical Fields

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 (ii) Int Cl (Ed.5) B60J 1/20; G03B 21/56, 21/58; E06B 9/56,
 9/58, 9/66, 9/68, 9/70

Databases (see below)

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASES: WPI

Search Examiner
 MR J FULCHER

Date of completion of Search
 27 JULY 1994

Documents considered relevant following a search in respect of Claims :-
 1 TO 12

Categories of documents

- | | | | |
|----|---|----|---|
| X: | Document indicating lack of novelty or of inventive step. | P: | Document published on or after the declared priority date but before the filing date of the present application. |
| Y: | Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: | Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: | Document indicating technological background and/or state of the art. | &: | Member of the same patent family; corresponding document. |

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 0580217	(WILMOT-BREEDEN)	1
X	US 4068921	(OKUMURA)	1

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